

Mixed portland cement



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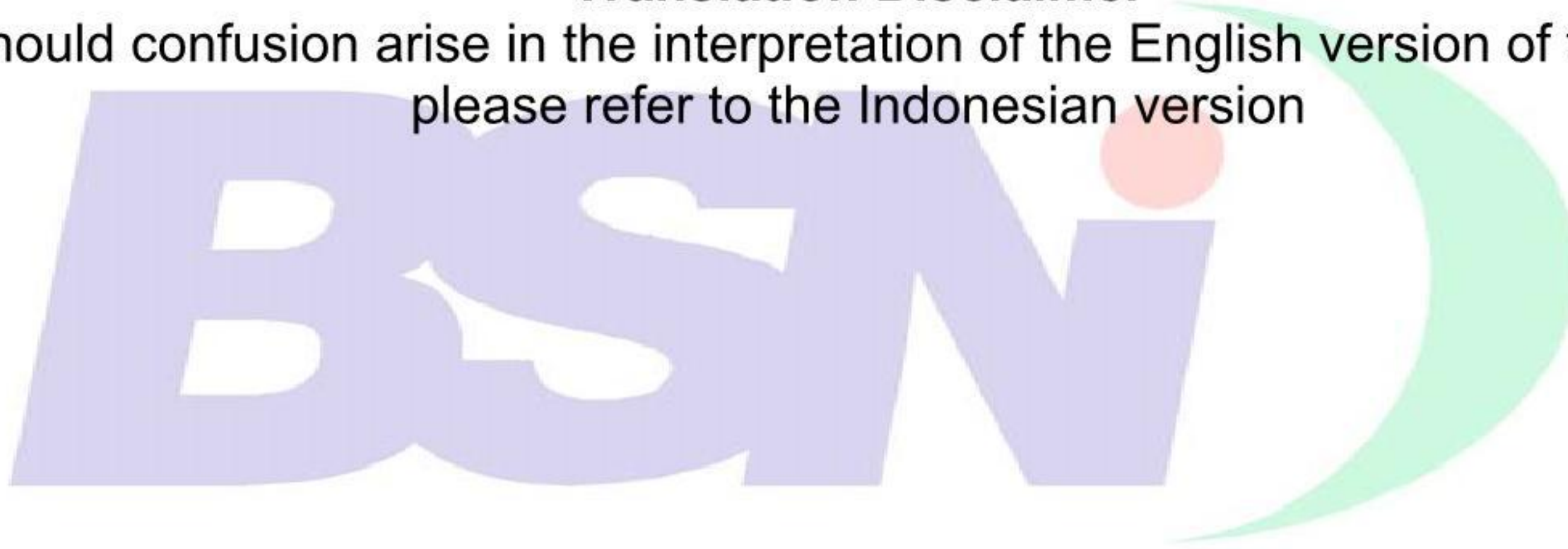




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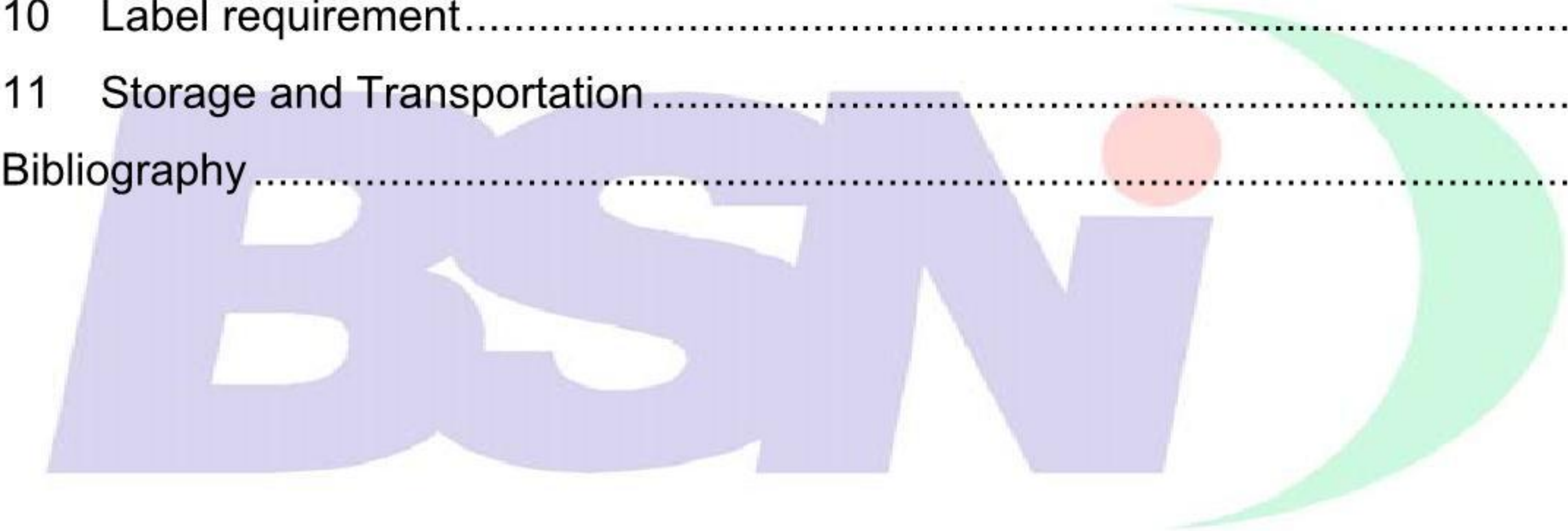
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Foreword

This Indonesian National Standard (SNI) Mixed Portland Cement is a revision of SNI 15-3500-1994. This SNI was revised because there were some changes in the standard which referring to and to avoid the miss implementation by consumer and to set the proper standard for the producer.

This standard was formulated by the Technical Committee, Panitia Teknis 35S, Kimia Anorganik (Inorganic Chemistry). This standard is the result of consensus meeting organized in Jakarta on December 8, 2003 , attended by representatives of various stakeholders namely producers, consumers, testing laboratories and regulators.



Mixed portland cement

1 Scope

This standard covers: scope, normative reference, terminology and definitions, applications, quality requirement, sampling methods, test methods, specification conformance, packaging, marking, storage and transportation for mixed portland cement.

2 Normative reference

SNI 15-2049-2004, *Semen portland*.

ASTM C 430-96, *Standard test method for fineness of hydraulic cement by the 45 μ m (No. 325) sieve*.

ASTM E11-01 *Standard specification for wire cloth and sieves for testing purposes*.

3 Term and definition

3.1 mixed portland cement

a hydraulic cement produced by pulverizing portland cement clinker and gypsum with one or more inert inorganic composition

4 Purpose

Mixed portland cement can be used for multi purpose in mixture cement production and concrete for contruction when the special properties with maximum friction caracteristic (f_c) 20 Mpa (200 kg/cm²) at 28 days is not required.

5 Quality requirement

5.1 Chemical requirement

Chemical requirement, SO₃ maximum 3%

5.2 Phisical requirement

Phisical requirement as pointed at table1:

Tabel 1 - Physical requirement

No	Item	Unit	Requirement
1	Fineness of residue in 45 μm (No. 325) sieve	%	max. 24
2	Form stable with autoclave - expansion - reduction	% %	Max. 0,8 Max. 0,2
3	Time of setting, Vicat test - Initial set - Final set	Minute Minute	Min. 45 Min. 375
4	Compressive strenght - 3 days - 7 days	MPa (kg/cm ²) MPa (kg/cm ²)	min. 10 (100) min. 15 (150)
5	Setting mien Final penetration	%	Min. 50

6 Sampling method

Sampling method and quantity of mixed portland cement for testing must accomplish with SNI 15-2049-2004, portland cement

7 Testing Method

7.1 Chemical test

7.1.1 Sulphur trioxide (SO₃)

Sulphur trioxide accord with SNI 15-2049- 2004, *Semen portland*.

7.2 Phisical testing

7.2.1 fineness

This testing to determine the degree of fineness of hydraulic cement by the 45 μm (No. 325) sieve refer to ASTM C 430-96, *Standard test method for fineness of hydraulic cement by the 45 μm (No. 325) sieve*.

7.2.1.1 Tools

a) sieve

Sieve frame consist of uncorosive metal when contact with water and have rectangular diameter 50,0 mm \pm 6,25 mm. the diameter of Sieve depth 75,0 mm \pm 6,25 mm from the top of sieve frame to sieve mesh.

All leght of sieve frame 89,0 mm \pm 6,25 mm or to stimulate the air circulate under sieve mash therefore sieve frame must have leg with maximum 12,0 mm. The sieve frame

must compatible with sieve mesh that made from rust resisting steel-wire AISI type 304 with 45 μm hole mesh (No. 325) refer to *ASTM E11-01* Standard specification for wire cloth and sieves for testing purposes.

The mesh must be mounting in the frame without distorsion, loose or contraction. For the Sieve that made with mesh to frame welding, the joint must be plate to avoid the cement traping in the joint between mesh and frame. For the Sieve that have two part must be clam thight to avoid the cement traping in the joint between mesh and frame.

b) Syringe Pipe

syringe Pipe must be made from uncorosion metal wheather contact with water and have 17,46 mm Diameter with center hole straight to longitudinal angle, midle line consist of 8 hole that each range 5,95 mm from center to center have 5° of angle from the longitudinal and the outer line that consist of 8 hole that each range 11,11 mm from center to center have 10° of angle from longitudinal axis. Each hole must have 0,51 mm diameter.

c) Measurement

Pressure meter must have min 75 mm diameter with 1 psi scale (6,9 KPa) and the maximum capacity is 30 psi (207 Kpa). Accuracy on 10 psi (69 Kpa) $\pm 0,25$ psi ($\pm 1,7$ KPa).

7.2.1.2 Calibration of sieve 45 μm (No. 325)

Put 1 gram standard sample No. 114 from *National Institute of Standars and Technology* on sieve 45 μm (No. 325), dried and cleaned, then do as point 7.2.1.3. Sieve corection factor is deviation between residue of test result and total residue that pointed on the label on sieve fineness requirement as presentage of testing residue.

Note Be aware that sieve corection as required is a factor times with residue come and that total which add to residu or reduced from residu in each test is equal with total residue.

Sample of corection factor determining for sample residue sieve Number 114 on the sieve 45 μm (No. 325)	12,2 %
Residue for 1 gram sample	0,122 gram
Sieve residu that has calibration	0,093 gram
Deviasion	+ 0,029 gram

$$\text{Corection factor} = + 0,029/0,093 \times 100 = + 31,18$$

7.2.1.3 Procedure

- Place 1000 g bulk sample on the clean and dried sieve 45 μm (No. 325). Make humadity all part slowly. Put off sieve from the bottom of syringe Pipe and arrange the tension in the pipe till 10 psi $\pm 0,5$ psi (69 KPa $\pm 3,4$ KPa).
- Put sieve back under the syringe pipe and wash till 1 minute, move the sieve with rotary moving on the horizontal position in one circle per second sprayering. The below part of syringe pipe must get in contact with the below of top of frame sieve for about 12,5 mm. Soon put off the sieve form srynge pipe, wash it with destilation of ionization water for about 50 cm³, be carefull for loosing more residu, and dried with clammy fabric the bottom slowly.

- c) Drain the sieve and residue in the oven or on the hot plate (NOTE 1), support the sieve so the air could flow freely on the below. Freeze the sieve than brush the residue from the sieve and scale with analitical balance that deviation not more than 0,0005 gram (NOTE 2).

NOTE 1 The sieve must keep from over heat, couse it could mellow the solder.

NOTE 2 After 5 times use, sieve must put in the asetat acid liquid (1+6) or HCl liquid (1+10) and rinse with destilasion or deionization water soon to leave out the trapping particles in the pit. After 100 use the sieve must be calibrated.

7.2.1.4 Calculation

Calculate the fineness of cement till resemble 0,1 % as below:

$$\begin{aligned} R_c &= R_s \times (100+C) \\ F &= 100 - R_c \end{aligned}$$

With:

F is the cement fineness that present as corection persentage that slip away from the sieve 45 μ m (No. 325);

R_c is residu correction, %;

R_s is sample residu that trapping on the pit of the sieve 45 μ m (No. 325), gram;

C is sieve correction factor (accordance with the procedure that mention at 7.2.1.2), the value can be plus or minus.

Example:

Sieve correction factor, C = + 31,2 %

Residue of testing sample, R_s = 0,088 gram

Residue correction, R_c = 0,088 x (100 + 31,2 %) = 11,5 %

Correction of total slip away, F = 100 – 11,5 = 88,5 %

7.2.2 Pressure strength

The test method of pressure strength must accord with SNI 15-2049- 2004, *Semen portland*, item 7.2.6 with slurry composition are from the mass of cement in gram and 1440 gram of sand. The mass of cement equal with 13,228 times netto in kilogram, that branded in package. The sand are consist of 720 gram sand of ottawa and 720 gram from attawa or Le Sueur. The total water measure in milimeter, must have flow 110 \pm 5 accord with state in the flow table.

Note : If the netto that branded in the package is 31,75 kg, the slurry must consist of 420 gram of cement.

The composition of slurry admitted about proportionate 1 : 3 between the volume of cement and sand, generally admitted for construction, in the calculation as follow: if a package of mixed prtland cement consist of 0,0283 m cement and 0,0283 m clammy sand consist of 36,29 kg dray sand, then:

$$A = 1440 \times (C/B)$$

with:

A is total of cement (gram) that used in the mixed with 1440 gram of sand;

B is 108,86 kg weight of dry sand in the 0,0849 clummy sand;

C is weight per package (kg)

Gradation of granule Ottawa sand must fulfill the specification as below:

Sieve	% slip away
1,18 mm (No. 16)	100
600 μm (No. 30)	98 ± 2
425 μm (No. 40)	70 ± 5
300 μm (No. 50)	25 ± 5
150 μm (No. 100)	2 ± 2

Gradation of granule of sand 20 – 30 must fulfill the specification as below:

Sieve	% slip away
1,18 mm (No. 16)	100
850 μm (No. 20)	85 - 100
600 μm (No. 30)	0 - 5

7.2.3 Shape durability with autoclave, time bond, mien bond and Kekekalan bentuk dengan *autoclave*, waktu pengikatan, pengikatan semu dan mortar airous is accordance with SNI 15-2049- 2004, *Semen portland*.

8 Specification conformance

The testing mixed portland cement was stated unconformance, if:

- The cement was failed to fulfill one of the specification that state in item 5.
- After second test, the cement was failed to fulfill one of the specification that state in item 5.
- The lost weight more than 2% from the weight that branded in every package even the average weight of every package or average weight of each delivery that represent of 50 package weighing that was taken at random sampling

Note : Second test could be done to the rest of cement in silo that would be delivered in the 6 month periode.

The mixed portland cement result testing certification that declare of fulfill the specification valid only to the grup which the sample was taken.

9 Pengemasan / Packing

Mixed portland cement could be place in the market in packing or curah. If, no other rules, mixed portland cement packing must be in 40 kg each pakage.

10 Label requirement

In the cover of packing must have information of, marking / trade mark, company name and net weight, for mixed portland cement curah, labelling must be include in the shipping document.

11 Storage and Transportation

- a) Cement when get in storage as well as get in transportation must keep some how that easy to do inspection and identification
- b) Storage of bulk cement should be in a watertight bin or silo so it could protect the cement from humadity and avoid agglutimation in storage and transportation.
- c) Storage or transportation of bagged cement, a shaded area or warehouse is preferred. Cracks and openings in storehouses should be closed. When storing bagged cement outdoors, it should be stacked on pallets and covered with a waterproof covering.



Bibliography

TIS 80-1974, *Mixed cement*.









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